### THE GROWTH OF NERVE FIBERS

The view that each nerve fiber develops as an independent outgrowth from a nerve-cell, finally becoming united to other tissues (*e. g.*, muscle fibers) in the periphery of the body is associated especially with the name of His, and has been accepted by the majority of embryologists. Those who have worked at the question of nerve repair or have studied the mechanism of the regeneration of nerve fibers which leads to restoration of functions are divided into two camps; the majority hold, as Waller originally taught, that the nerve fibers grow in a distal direction from the cut stump attached to the central nervous system, ultimately finding their way into the peripheral segment. A minority of researchers hold the contrary view, namely, that restoration occurs in the peripheral segment independently of connection with the central nervous system.

Within the last year, Mr. Ross Harrison, of Yale, has demonstrated the correctness of the views of His in a very remarkable way. He has actually seen the fibers growing outwards in embryonic structures. Pieces of the primitive nervous tube which forms the central nervous system were removed from frog embryos and kept alive in a drop of lymph for a very considerable time; the cilia of the neighboring epidermic cells remained active for a week or more; embryonic mesoblastic cells in the vicinity were seen to become transformed into striated muscular fibers, and there was therefore no doubt that even under these artificial conditions—rendered necessary for microscopic purposes—life and growth were continuing. From the primitive nervous tissue, and from this alone, nerve fibers were observed growing and extending into the surrounding parts. Each fiber shows faint fibrillation, but its most remarkable feature is its enlarged end, which exhibits a continual change of form. This amœboid movement is very active, and it results in drawing out and lengthening the fiber to which it is attached, and the length of the fiber increases at the rate of about 1 micromillimeter per minute. Those interested in this subject should refer to Mr. Harrison's last paper, published in the *Anatomical Record* (Philadelphia, December, 1908), where they will find figures representing the growing fibers in various lengths drawn at intervals of half an hour or thereabouts.

Such observations show beyond question that the nerve fiber develops by the overflowing of protoplasm from the central cells and thus give us direct ocular evidence in favor of the view which most embryologists previously held mainly as the result of circumstantial evidence. It is not surprising to find that as this and other facts all bearing in the same direction are brought to light, the prevalent idea regarding nerve regeneration after injury follows the same lines. Indeed, the number of those who hold the so-called "autogenetic theory" of nerve regeneration is being reduced nearly to vanishing point.—*Nature.*

## SPECIAL ARTICLES

### HYDROGEN POLYSULPHIDE AS A REDUCING AGENT

When lime and "flowers of sulphur" are boiled with water and the resulting cooled, clear solution poured into dilute hydrochloric acid, a heavy colored liquid separates. This liquid is stated by some chemists to be an impure hydrogen polysulphide, whereas others regard it as a mixture of several hydrogen polysulphides.

The substance has well-developed reducing properties and I have found that its employment in organic work appears to offer considerable advantages in many cases.

The chief merits of hydrogen polysulphide, as compared with ordinary reducing agents, are as follows: It is neutral; it may be used at the ordinary temperature, dissolved in ionizing solvents such as water or alcohol, or in nonionizing media such as carbon bisulphide. The exact quantity of hydrogen polysulphide present in any of its solutions may be determined with great ease by titration with iodine.

At the ordinary temperature, hydrogen polysulphide reduces picric acid to picramic acid. With nitrobenzene its reaction appears to be somewhat more complicated. Further work on this subject and also on the general applicability of hydrogen polysulphide as a reducing agent is being carried out in the chem-